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Tax Competition

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Fostering capital account convertibility was not among the mandates of the International Monetary Fund when it was founded in late 1945. And it is still not today in spite of a forceful initiative of the Fund's management in 1990 in this direction, calling for an amendment of the Articles of Agreement that would have transformed the IMF's role in capital account liberalization and capital account issues in general. Support for such an amendment was strong throughout the mid-1990s and it was not until the East Asian crisis of 1997 and the contagion spreading through Asia and beyond that the idea was eventually ceased[1]. Interestingly, Article VI of the Fund's Articles of Agreement is still in place stipulating that a "member may not use the Fund's general resources to meet a large sustained outflow of capital" and that the Fund may even "request a member to exercise controls to prevent such use".

Nevertheless, since at least the 1980s and prior to the second half of the 1990s the IMF has actively encouraged member countries to open their borders to foreign investment, technology and trade as a path to economic growth, emphasizing the benefits of an unrestricted access to international capital markets and paying little if any attention to the potential risks related to the volatility of capital flows and the loss of control of the refinancing behaviour of commercial banks. It is only fairly recently that a rethinking has begun and the prudence of at least some restrictions on unfettered capital mobility is being seen.

This is somewhat surprising because the key theoretical rationale for capital account liberalization is primarily the shaky argument that capital mobility promotes an efficient global allocation of savings and a better diversification of risk[2]. This traditional view amounts to hardly more than an inappropriate generalization of Adam Smith's famous *invisible hand* passage. There he argues that a selfish individual handing his savings to the investor offering the highest rate of interest effectively, if unintentionally, maximizes its contribution to output[3]. While this conclusion is obviously correct for the case of a single country, it need not

necessarily be so for two or more countries. The reason is simply that international investors also take into account expected exchange rate changes. Equilibrium in an integrated capital market with capital mobility is characterized by the covered interest rate parity which definitely does not imply that capital necessarily ends up where the real rate of return is highest let alone that real rates of return are equalized across countries as long as exchange rates are flexible. There is consequently no need to recur to the usual suspects, that is, market imperfections such as information asymmetries or domestic distortions[4], to nurture doubts as to the efficiency enhancing role of capital mobility.

The race to the bottom

Volatility of investor sentiments, herd behaviour, contagion effects, and the loss or at least impairment of monetary control are all downsides of unrestricted capital mobility. Another one is tax competition. While some emphasize the virtues of a check on the state's monopoly to set tax rates, others deplore the inequality and inefficiency aspects associated with the ability of a mobile factor to avoid taxation. It was Oates who first articulated the idea that governments, in an attempt to prevent mobile capital from migrating, are forced to adopt inefficiently low taxes on capital and a less than optimal level in the provision of public goods[5]. This view was subsequently formalized in more elaborate models by Wilson as well as Zodrow and Mieszkowski that started a broad discussion[6].

In the late eighties and early nineties when numerous formerly closed countries started to liberalize their capital accounts the fear was voiced that even large countries would be forced to participate in a race to the bottom. Frey put that very clearly: "Take the example of a factor ... like capital, which is perfectly mobile between countries. It will flow to the state with the lowest tax rate. In equilibrium, the tax rate in each state will be driven to zero because each one will compete for that tax base"[7]. This assertion is nothing but a straight-forward variant of the famous Bertrand paradox for price competition in homogenous markets. Indeed, if capital is perfectly mobile and nothing but the tax rate matters for its choice of location, a zero tax on capital is the only equilibrium solution. However, already minor deviations from the strong assumptions underlying Frey's proposition suffice to make the paradox disappear and to clear away the fears of a race to the bottom.

Perfectly mobile capital

Let us stick for the moment to perfect capital mobility and start first with the less than convincing notion that investors care for nothing but the tax rate. Rather, one would expect that investors put their capital where its net return is highest. Tax rates therefore do matter, but gross returns do as well. In a competitive neoclassical world with more than one factor general equilibrium requires that net returns on capital be equalized across all countries. This merely implies that countries with higher corporate taxes must have correspondingly higher gross returns on capital. It is not at all apparent whether in such a situation forces are at work that provoke a race to the bottom.

To keep things simple consider a world where all countries i work with the same neoclassical technology and charge exactly the same tax $t_i = t$ on resident capital. If country j would now raise its tax marginally to $t_j > t$, this should normally trigger a capital outflow, yet by no means a landslide that would strip it of resident capital altogether. Making capital more scarce domestically, the outflow would just have to be large enough to boost its marginal productivity to the point where again its domestic net return matches that of all other countries. The magnitude of the required outflow of capital may be small or large, depending essentially on the technology or, more precisely, the relevant elasticity of substitution. But what is more important for our purposes is that the tax hike in country j would lead to larger collections from this tax[8]. So, from a fiscal point of view, there may well be an incentive to raise taxes, but there is certainly none to lower them, let alone to start a race to the bottom.

So far, we have focussed exclusively on the cost aspect of taxation, disregarding on what the resulting revenues are spent. A government investing heavily, for instance, in education and infrastructure may noticeably enhance the business environment and thus favourably influence the profitability of enterprises. The drive to migrate from countries with higher taxes referred to in the previous paragraph may hence be mitigated if not eliminated altogether through this indirect effect of taxation. Indeed, one may conceive of companies requiring certain minimum levels of infrastructure and skilled labour to succeed that would voluntarily opt for a tax higher than zero because of the resulting more suitable environment. To see that, consider net after tax profits of a company, $\pi^j_{net} = \pi^j(p, w, I)(1 - t)$, where t is the tax rate, π^j are indirect profits as a function of commodity and factor prices, p and w, and of the infrastructure I provided, which in turn is modelled as a positive monotone function of the revenue collected, i.e. $I = I(t\pi^j)$. Differentiating π^j_{net}

with respect to t and evaluating the result at $t = 0$ we have

$$\frac{\partial \pi^j_{net}}{\partial t}\Big|_{t=0} = \left(\frac{\partial \pi^j}{\partial I} - 1\right)\pi^j.$$

Now, as long as $\partial \pi^j / \partial I$ exceeds 1 at $I(0)$, the RHS is positive which means that the firm would voluntarily choose a tax rate larger than zero.

The nexus between what tax rate exactly the firm would opt for and what rate, in turn, the government would set is technically complex and will not be pursued any further. However, it would not appear appropriate to ignore these indirect effects altogether. Furthermore, another indirect effect that should not be ignored is the impact massive migration of capital to a low tax country may have on its factor price system and that of the countries of origin. Ireland is a case in point. Once a low wage country[9], its policy of low taxes has attracted so much capital that Irish wages rank now among the highest worldwide.

Partially mobile capital

As another case where the race to the bottom would come to a halt, let us return to the assumption that nothing but the tax rate matters for capital owners but assume that only a part of a country's capital is perfectly mobile while the remainder is not. More specifically, assume there are two countries, $i = 1, 2$, with two types of companies: firms which are perfectly mobile, labelled PM, and completely immobile firms, called the domestic industrial base and labelled DIB. We will furthermore assume that pre-tax profits are independent of a country's flat[10] corporate tax rate t_i and write Π_i^{PM} and Π_i^{DIB} for that country's total pre-tax profits of its mobile and immobile sectors, respectively. Once all restrictions on the movement of capital are lifted, the mobile companies will move to the country offering the lowest tax rate. Country i's revenue from the corporate tax is then given by

$$T_i = t_i \Pi_i^{DIB} + \left(\begin{array}{ccc} t_i(\Pi_1^{PM} + \Pi_2^{PM}) & \text{iff} & t_i < t_j \\ \frac{1}{2} t_i(\Pi_1^{PM} + \Pi_2^{PM}) & \text{iff} & t_i = t_j \\ 0 & \text{iff} & t_i > t_j \end{array} \right), \qquad (1)$$
$$i, j \in 1, 2, \quad i \neq j.$$

This is where tax competition sets in. But as is known from Edgeworth's model of homogeneous price competition with constrained capacities, there is a downward limit larger than zero[11]. With tax revenue from the domestic industrial base taking the role of Edgeworth's residual revenue, there must be a lower bound for the corporate tax rate, $\underline{t}_i$,

that country i would not be prepared to undercut. This lower bound is defined by the downward 'switch point' where the country is indifferent between maintaining its pre-liberalization tax rate, t_i^0, and offering this lower tax rate $\underline{t}_i$ to attract mobile capital, that is where

$$t_i^0 \Pi_i^{DIB} = \underline{t}_i (\Pi_i^{DIB} + \Pi_1^{PM} + \Pi_2^{PM})$$

holds. Rearranging, we have for this lower bound

$$\underline{t}_i = t_i^0 \frac{\Pi_i^{DIB}}{\Pi_i^{DIB} + \Pi_1^{PM} + \Pi_2^{PM}}, \tag{2}$$

which implies $0 < \underline{t}_i < t_i^0$ since all terms on the RHS are positive. Without loss of generality we may assume country 1 to be 'large' compared to country 2 in the sense that its domestic industrial base is larger, i.e. $\Pi_1^{DIB} > \Pi_2^{DIB}$. If both countries applied originally more or less identical corporate tax rates so that $t_1^0 = t_2^0$, equation (2) implies

$$\underline{t}_1 > \underline{t}_2. \tag{3}$$

The outcome of this game depends, of course, on how it is played. If moves were to be made simultaneously, the result would be an equilibrium in mixed strategies along the lines of the original Edgeworth model. However, since legislators are not used to throw dice and, in addition, typically have to follow their own issue-related agenda of parliamentary readings, a sequential game played either as a one-shot game or over several rounds appears to be the more appropriate setup. Of these the former with the small country moving first is the only convincing one, for two reasons: first, in parliamentary democracies, once a tax system is changed, the change will typically be maintained for at least a couple of years; and second and more importantly, the large country cannot gain from moving first.

To see that, suppose the large country 1 moves first by setting its new tax rate at or above $\underline{t}_1$. In view of (3), such a rate could and would be undercut by the smaller country 2, leaving country 1 with but a reduced tax revenue from its domestic industrial base and no revenue whatsoever from mobile capital. Consequently, the large country 1 is better off by leaving its original tax rate unchanged and deliberately foregoing any opportunity to move first. In contrast, country 2's optimal first move would be to set t_2^* equal to $\underline{t}_1$, thereby precluding any incentive for country 1 to undercut.

The resulting Nash equilibrium is hence

$$(t_1^*, t_2^*) = (t_1^0, \underline{t}_1), \tag{4}$$

which means that the 'small' country will exercise tax dumping and attract all mobile capital whereas the 'large' country will stick to its old tax regime and be left with nothing but the revenue from its domestic industrial base[12]. This result is easily extended to the case of more than two countries where again just one country – most likely the one with the smallest domestic industrial base – has an incentive to lower taxes while all others stick to their original rates. The model may thus explain why typically large countries call for "tax harmonization" whereas small countries do not.

Conclusion

Taking Obstfeld and Taylor's stylized view on capital mobility in modern history for granted, capital mobility was very high already before World War I, dropped subsequently to very low levels through the end of World War II, to rise again sharply after the collapse of the Bretton Woods System and, in particular, after 1980[13]. Today, little prevents internationally oriented firms to settle in the country of their choice. Numerous factors play a role in this decision: taxes certainly do, but so do infrastructure, good governance, reliability of the legal system and, not least, wages. A large body of literature has focussed on taxes and the fear that competition for the tax base and for jobs would force governments into a race to the bottom. In the two rather different settings discussed above we found little theoretical evidence for such a race to be inevitable. It is therefore not surprising to see that the vast empirical literature addressing this issue remains predominantly indecisive and that some studies even find evidence to the contrary[14].

Notes

1. Tagaki, Shinji, Jeffrey Allen Chelsky et al., *The IMF's Approach to Capital Account Liberalization,* Evaluation Report, Washington, D.C.: International Monetary Fund, 2005, p. 19.
2. Cf. Fischer, Stanley, "Capital Account Liberalization and the Role of the IMF", in: *Should the IMF Pursue Capital Account Liberalization?*, Essays in International Finance No. 207, Department of Economics, Princeton University, 1998.
3. Smith, Adam, *An Enquiry into the Nature and Causes of the Wealth of Nations* (1776), quoted from R. H. Campell and A. S. Skinner (eds.), Glasgow Edition of the Works and Correspondence of Adam Smith, Oxford: Clarendon Press, 1976, p. 456.
4. See for example Stiglitz, Joseph, "Capital Market Liberalization, Economic Growth and Instability," *World Development,* 28 (2000), 1075-1086 and *idem*, "Capital-Market Liberalization, Globalization, and the IMF," *Oxford Review of Economic Policy,* 20 (2004), 57-71.

5. Oates, Wallace E., *Fiscal Federalism*, New York: Harcourt-Brace-Jovanovich, 1972.
6. Cf. Wilson, John D., "A Theory of Interregional Tax Competition," *Journal of Urban Economics,* 19 (1986), 296-315, and Zodrow, George R., and Peter Mieszkowski, "Pigou, Tiebout, Property Taxation, and the Underprovision of Local Public Goods", *Journal of Urban Economics,* 19 (1986), 356-370. An authoritative survey of this literature is given in Wilson, John D., "Theories of Tax Competition," *National Tax Journal,* 52 (1999), 269-304.
7. Frey, Bruno, "Intergovernmental Tax Competition", in: Charles E. McLure, Jr., Hans-Werner Sinn et al., *Influence of Tax Differentials on International Competitiveness, Proceedings of the VIIIth Munich Symposium on International Taxation*, Deventer: Kluwer Law and Taxation Publishers, 1990, 87-96, p. 87.
8. Cf. Braulke, Michael, and Giacomo Corneo, "Capital Taxation May Survive in Open Economies", *Annals of Economics and Finance,* 5 (2004), 237-244. It is often maintained that in a context like this and if the country considered is small enough, all revenue collected from an increased tax levied on a perfectly mobile factor will have to be borne exclusively by the immobile factors of that country. What is less known, however, is that world income of this mobile factor would eventually decline by exactly what the tax raising country collects additionally. This was first shown by Bradford, David F. "Factor Prices May Be Constant But Factor Returns Are Not", *Economics Letters,* 1 (1978), 199-203 for the case of countries of equal size and further elaborated by Kotlikoff, Laurence J., and Lawrence H. Summers, "Tax Incidence", in: Auerbach, Alan J., and Martin Feldstein, eds., *Handbook of Public Economics, Vol. II*, Amsterdam: North Holland, 1987, 1043-1092 who reach similar conclusions for a model with two countries of unequal size.
9. For an early witness see Keynes, John M., "Rents, Prices, and Wages", *Economic Journal*, 18 (1908), 472-473.
10. This is the typical property of the corporate tax of most industrialized countries.
11. Edgeworth, Y. Francis, "La teoria pura del monopolio", *Giornale Degli Economisti*, 40 (1897), 13-31.
12. It is quite conceivable that country 1, after loosing part of its tax base to country 2, feels the need to adjust its tax rate.
13. Obstfeld, Maurice, and Alan M. Taylor, *Global Capital Markets: Integration, Crisis and Growth*, New York: Cambridge University Press, 2004, Part II.
14. Cf. Lammert, Christian, "Modern Welfare States under Pressure: Determinants of Tax Policy in a Globalizing World", *IRPP Working Paper Series*, No. 2004-01, Montreal: Institute for Research on Public Policy, 2004, or Mendoza, Enrique G., Linda L. Tesar, "Why Hasn't Tax Competition Triggered a Race to the Bottom? Some Quantitative Lessons from the EU", *Journal of Monetary Economics*, 52 (2005), 163-204.